

MONTHLY JOURNAL OF
THE MUSHROOM GROWERS'
ASSOCIATION

MGA

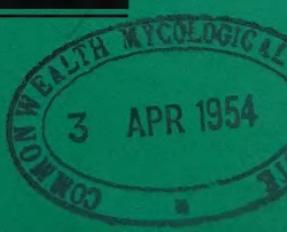
BULLETIN

APRIL, 1954

NUMBER 52

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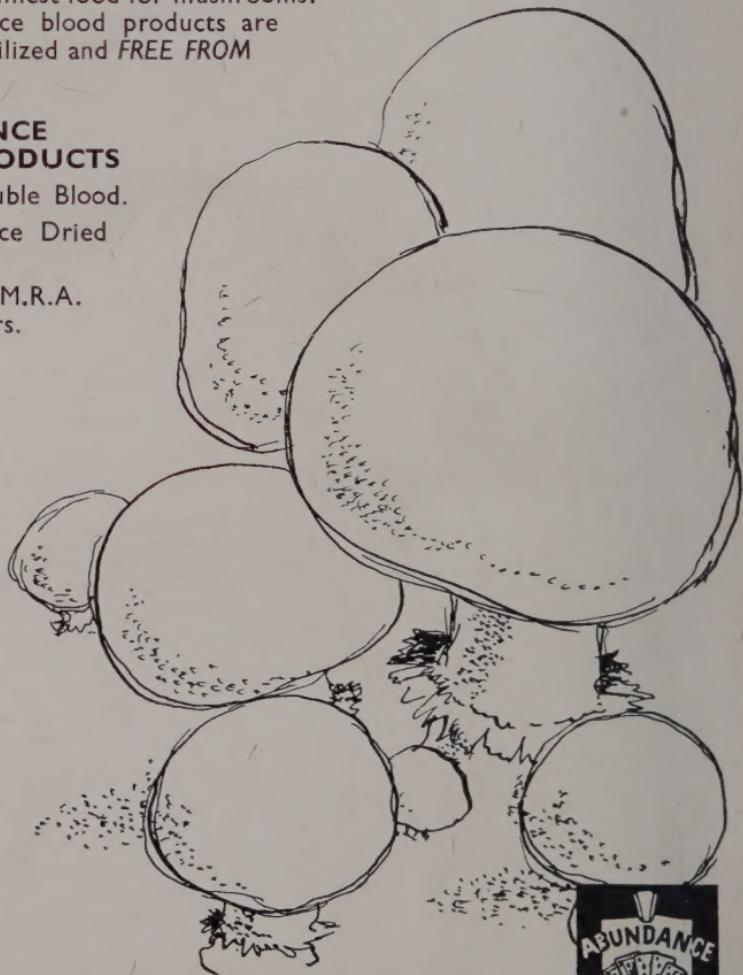
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The

APRIL • 1954

MGA BULLETIN

NUMBER 52

EDITORIAL

HOW IS IT GOING ?

The appeal for funds for Publicity has now been well and truly launched and, at the time of writing this Editorial, just about two weeks after the appeal was posted to Grower Members, something over twenty per cent. of the growers had signified their willingness to give the appeal their full support.

True, some of the growers have added the provision " provided the majority of members agree to do likewise," but, by and large, the support has been widespread, from the growers with 50,000 sq. ft. down to the lady member who, with only 60 sq. feet, said she was only too anxious to help. So too has support come from some growers who do substantial sales direct to the public, even to one grower who, disposing of no less than 1,000 lb. per week in this manner, offered without hesitation to deduct his farthing per chip and send it in as a direct contribution to the fund. And he could so easily have remained silent!

The goodwill and good fellowship which exists in the mushroom industry and amongst the growers in particular, has to be experienced to be believed and, with such a spirit behind it and such a commodity to sell, failure should be out of the question.

At its feet, the cultivated mushroom has a vast and untapped market and it is at this market that publicity is aimed. A successful publicity campaign does not necessarily mean increased prices, but it should mean a larger demand and more stable prices. Increased demand and stable prices give confidence and with confidence comes expansion and with expansion a cutting of costs and an increased profit margin, always providing the price remains stable. No pipe dream this, surely, but just plain logic !

A number of salesmen have already intimated their willingness to co-operate and for that the Association will always be grateful, no matter what the outcome of the scheme, for it was realised from the very start that they would, of necessity, have to do much of the donkey work if the much-needed money was to be collected.

What is now needed is that extra push to make sure that the majority of growers come in. It is of paramount importance that each and every grower pulls his weight.

Growers can rest quite assured that their support is purely voluntary. The signature on the appropriate slip is not binding for all time. Any grower can withdraw his support at any time.

By the time the annual general meeting comes round, providing sufficient support has been obtained, a definite plan for publicity will be placed before the members. If and when that plan is put into operation, do not expect miracles overnight. Give it a chance to run and judge it, not soon after its beginning, but when it has completed its first full run.

W.R.A.

HAROLD G. BOXALL relates experiences with

THE FEARSOME PHORID

During the early summer of 1953, the Directors of a well-known mushroom farm near Worthing were worried by their inability to subdue flies with the normal range of insecticides. It appeared that the flies were unaffected by DDT, BHC and the like. No one knew at that time that they were not ordinary flies, or realised that before the autumn was over these unusual flies would nearly overwhelm the mushroom industry in Sussex.

Preparation for the autumn crop went on whilst stories of heavy fly infestation in some farms went around the district. Growers were on their mettle, and most of them were a little more careful to dust or spray regularly. Generally no one really worried because experience had shown us that no fly could stand up to BHC. Meanwhile *Coelopa frigida* was breeding in millions in the seaweed on the beach and getting plenty of publicity. This larger fly caused lots of inconvenience, and perhaps loss, to the holiday trade, but it was nothing compared to the ravages of the "Fearsome Phorid," alias *Megaselia halterata*, which had descended on the mushroom houses.

The bulk of the mushrooms grown in this area go 'down' in August, September and October in glasshouses, and it was these crops that felt the brunt of the attack.

It was early in September that we started to compost 4 tons of straw with MRA synthetics and the history of this particular house is probably typical of what happened to so many growers, whether using dung or synthetics. Nothing unusual was noticed during composting—no more flies than usual—no less spraying than usual. The compost went 'in' without incident and as near perfect peak heat as we could manage was attained. On 2nd October, the house had cooled and walking into it one sensed that the compost was as good as it was possible to get. It must be established here that we were satisfied that we had done all that was possible to prepare a compost free from all insect and fungus competitors of the mushroom, but that we had added nothing to the compost before peak heat that would be likely to carry over after peak heat and still be insecticidal.

It was spawned on that day with manure spawn. During the next 7 days whilst the temperature was kept at 70°, very few flies were seen in the house, and two dustings of BHC were applied. Everything appeared to be normal. The spawn began to push out into the compost.

On the eighth day when making a close inspection of the beds, I noticed that the spawn lumps appeared to be losing their blueish white appearance, and the mycelium had ceased to extend its influence in the beds, but no fly larvae or pupae were to be seen outside the lumps of spawn. However, on taking out a piece of spawn and breaking it in half, I discovered at least two dozen maggots in it. I hastily found the next piece of spawn—and the next—and the next. Each was ‘lousy’ with maggots. Everywhere I looked in the house it was the same.

My first thoughts were that the spawn had arrived on the Nursery infected, but that was immediately dismissed on two counts—cold storage and the time factor. Could it have been infected whilst it stood for a day in the packing shed? Hardly—at least not so thoroughly as it was now. It must have been infected immediately after the house was spawned.

We went carefully over the beds and took out every piece of spawn and burnt it. Then we re-spawned with the same sort of spawn. Eight days later in spite of using DDT, BHC, Nicotine and HETP alternately, exactly the same thing happened again—all the pieces of spawn were full of maggots. As a last resort we rubbed in grain spawn on the surface, but the larvae found this out, each grain being attacked by four or five maggots. There was no infection of the compost, the larvae were only interested in the spawn.

I visited at this time, two other well-known mushroom growers and they were having the same experience. There was nothing else to do except to run out the houses and start again.

All this happened to most of us late in the season. Cooler weather followed—weather that was not so favourable to fly breeding. Flies were still to be seen, but the difficulty was to tell what sort of flies. You can ask a mushroom grower now, “Have you still got fly?” and he will probably say “Yes”—but he doesn’t know whether they are Sciarids, ordinary Phorids, or ‘Maggie’ the Fearsome Phorid.

The point has been reached where many have lost their nerve to grow mushrooms. Many a small grower cannot afford to go on experimenting and losing crops. The season is over and nobody knows whether they have found the answer or not. There is however a fear that the fly will return next season, and methods of combating it are being worked out. At a recent conference organised in Worthing by a well-known chemical firm, I suggested that poisoning the spawn might be the answer. The first experiments in this direction are now being started. Lindane seed dressing has been mixed in a carton of grain spawn, which has been put into the beds in the normal way. If the Lindane has no effect on spawn growth, the way is open for further experiments.

I have already reached the following conclusions:—

1. The Phorid is not the slightest bit interested in compost or dung unless it has the mycelium of a fungus growing in it.
2. It appears to be able to smell the spawn immediately it has been put into the beds. Can we mask that smell by a more powerful smell and hoodwink the fly?

3. We can kill the fly with BHC dust, but how long after it has come in contact with the insecticide does it take to die? Is it a long time? Can it go on laying eggs before it dies? If it can and does then surface dusting is useless.
4. If we could poison the spawn without affecting its germination we could kill the grub, but only when it eats the actual spawn or grain that is put into the beds. Presumably new mycelium growth would still be vulnerable.

Can we find an insecticide that we can disperse in the compost during turning that will survive an efficient peak heat? Will BHC stand composting temperature of 160° F., and remain a stable insecticide? Wood says "Yes," Hey says "No." Even if the compost was efficiently impregnated, the grub would have to pass through a sort of BHC minefield to reach the spawn. Many would survive the journey.

Is there a ventilator that will not let flies into the house?

Can we have some form of killing agent such as an aerosol that is always present in the atmosphere of the mushroom house, that will kill the flies within seconds? In a well ventilated house, with rapid air changes going on all the time, this would be a difficult problem, and expensive in insecticide.

It seems to me therefore that our best line of attack is against the fly itself; because fighting its other life stages all have difficulties. A light burning behind a sheet of glass that has been painted with ordinary motor oil will trap thousands of flies. Windows glazed with very narrow slits between the panes of glass, also painted with oil, will catch the flies as they try to enter the house.

I make all these points and ask all these questions to provoke discussion, and hope that there are growers, or any other members of the industry, who will supply the answers. It may happen that 'Maggie' will not visit us in such numbers again—I think this is most probable—but we must be prepared.

MUSHROOMS AND AGRICULTURAL RETURNS

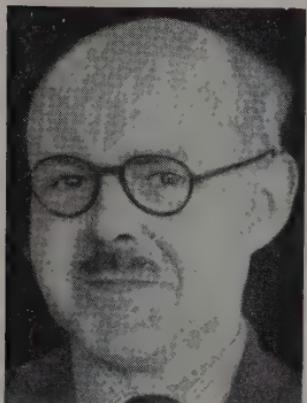
At its last meeting the Executive Committee of the MGA approved a suggestion that mushrooms should be included in the quarterly returns of the Ministry of Agriculture.

This decision followed a request from the National Farmers' Union who, in turn, had been asked for this inclusion by the Lancashire Branch of the NFU.

In agreeing to the proposed inclusion the Committee, whilst appreciating that this would involve even more form filling, felt, as did the NFU, that the time had come when a reliable figure covering the industry in this country was most desirable, both with regard to the number of growers and the area under cultivation.

The eventual compiling of these figures should put an end, once and for all, to the speculation as to the number of growers, the annual production, and the place the MGA occupies in the commercial mushroom industry.

WHO'S WHO? B. D. MORETON



It was while reading for his degree in Agriculture at Wye College that B. D. Moreton became especially interested in insects; the degree obtained, his studies became specialized and in 1936 he was awarded the College Post-Graduate Diploma in Entomology with Distinctions.

The Entomology Department in which he worked, headed by S. G. Jary, was then sandwiched between the Departments of Mycology (W. M. Ware) and Chemistry (N. H. Pizer). At that time a distinct aroma of mushrooms and compost was beginning to pervade the research block and it is not surprising that Moreton

became overpowered and was soon joining the work on mushroom pests. He spent much time on the identification of Phorids and in attempts to breed them in the laboratory—he claims that the latter task is as baffling now as it was nearly twenty years ago.

In the middle '30's, openings for biologists were few and Moreton showed his versatility by spending a year as a journalist followed by a period on the soil survey of Sussex. The outbreak of war was a signal for the mobilization of Entomologists and in 1940 he was put in charge of the wireworm survey of West Sussex, a responsibility which was his until peace returned. The period was rich in experience with pests of food crops and he became particularly familiar with the glasshouses of Worthing.

Little research on mushroom problems had been done at Wye since 1939, and the light gave another flicker when Jary left in 1948. His place as Advisory Entomologist was, however, filled by Moreton who is once more to be seen poring over beds of compost; this time with an illuminated lens of improved pattern.

The post-war years have added new weapons for the control of insect pests and novel problems have followed their use. Fundamental research is now the responsibility of full time workers but a peep beneath the benches in the entomology laboratories at the NAAS headquarters at Wye would reveal enough miniature mushroom beds to convince the seeker that Moreton's lucid articles and excellent illustrations are not founded entirely on other men's work. At least one colleague is impressed by his careful disentanglement of cause and effect and by his refusal to be deceived by what seems to be—the attributes of a true researcher.

Mr. V. L. BARROW, B.Sc., Managing Director of The Bradford Fertilizer Co. Ltd., has accepted the position of manager of the fertilizer section of Brantom, Shirley & Co. Ltd., London, S.W.1, as from 1st April. Mr. Barrow is well known to mushroom growers, and all wish him well in his new sphere.

PUBLICITY—AND YOU

by DONALD FREEBORN *

In the face of many theories being considered to-day, I think it would be well to preface my article with a statement of our object. All engaged in the Mushroom Industry, whether as producers, distributors, or in any other way, have one fundamental object, the making of profit. In recent years this has in most cases been attained, but the contracting margin between the cost of production and the net realisation of the crop to-day gives many of us much anxiety for the future.

As has so often been said, the problem of the narrowing gap between costs of production and the value of the crop produced can be tackled from either side. Research for efficiency goes on continuously, and has accomplished much. It has not, however, kept the gap open wide enough, and our attention is of necessity directed to the other side, the problem of what steps we can take to increase the net return.

The need to increase the demand for mushrooms is urgent and without doubt, if the consistently downward trend in the average net return over the post-war period is to be arrested. The demand can best be stimulated by a publicity campaign on modern lines, directed especially at public education in the use of mushrooms, and sales promotion in times of glut. All this costs money, in much greater terms than could ever be considered by an individual or a regional group.

It is therefore heartening to hear that there are distributors who are prepared not only to assist the producing side of the industry by collecting, when so authorised, a small levy on each package, but also to make equal contribution themselves.

This is almost a reversal of historic roles, for here at last is an opportunity for the grower to get something out of his salesman! *Send, and send in good measure, to contributing distributors, and make them buy half your publicity.*

Wholesale fruit and vegetable distributors are indeed very conscious of the competition for the housewife's purse from other directions, due to the higher cost of many equally important items, the increased supply under greater sales pressure of many items, especially sweets and confectionery, and to changes in spending habits. Our National Federation is even now engaged in exploring the possibility of a publicity campaign on a nation-wide scale. Many such proposals have been made in the past, but have not gone ahead owing to the difficulty of raising adequate funds for a venture from which all will benefit, but which is paid for by a varying proportion of voluntary contributors.

If the Mushroom Growers and their distributors can break this impasse, and give a lead to the non-specialist producers of the country,

*Mr. Freeborn, a Chartered Accountant, is Secretary of J. WOOD & SONS (LEEDS) LTD. and the other companies forming the Cowling Group, wholesale distributors in the West Riding of Yorkshire.

they will have rendered a service to the growing industry out of all proportion to their numbers.

Mushroom Growers! You now have behind you a research organisation which has been largely created by co-operative endeavour. **Follow this example by building up your own publicity campaign.** The one is complementary to the other, and both can be equally valuable in their service to YOU.

W. A. B. HARDING adds this note

I would urge that the responsibility for publicity is essentially the pigeon of *each and every* grower as a vital matter supplemented by guidance from the MGA, rather than the pigeon of the MGA as a recent Editorial suggests.

Recent personal investigations show very clearly that the Retailer must be persuaded by direct contact in some way in order to soften the point of greatest resistance. Direct contact is the only effective method in the form of a personal call on all the known retailers of mushrooms in each grower's locality. A remote type of propaganda mostly makes no headway whatsoever, but when carried out personally a retailer is often more receptive to ideas and is more easily convinced.

If each of us makes it an *individual* affair and takes immediate and concerted action—as ALL of us must—then those of us who may have felt strongly against helping to grow, and now to sell, the produce of the other fellow who has done nothing to contribute, will then have no cause for future grievance.

Leaflets can be a useful supplement to personal contact with the retailer—get him to agree to giving sales promotion a trial—the leaflets being *displayed* on his counter for the housewife to help herself and become keen to get hold of, say recipes; this will be the start of a gradual build-up for stimulating sales.

In the last resort where a grower is tied to his farm, postal propaganda could be used, and through the market salesmen a bulk distribution of leaflets* to the most prominent and helpful retailers.

The grower must now be a salesman for, as well as a producer of, his wares.

*I was told recently, by a prominent wholesaler, that the Trade estimated that, when leaflets were sent to retailers, 1 in 10,000 reached the public!—Editor.

MAC'S MUSHROOM FAMILY

4. Agatha, Lady Agaricus



GROWING

IN

STEPS

FIRST

by

McGregor Bulloch

4 – SOME CONSIDERATIONS ON THE SITING AND LAYING-OUT OF A FARM

Although meant for those who are building a new farm, these notes should be of equal interest to a beginner who has acquired a second-hand installation, or is adapting existing buildings for growing mushrooms.

With regard to the general layout of buildings, it is preferable, in order to reduce contamination, to arrange for the composting shed to be situated at some distance from the growing rooms. If space does not permit of this separation, then careful observance of hygiene will be necessary. With tray-growing, efficient mechanization is only possible when the composting-shed is near the peak-heat rooms and growing-sheds, so that conveyors may be used. It should be noted here that very few farms have their composting ground set at a distance from the main buildings.

Advantage may be taken of ground slope, if present, by laying out the sequence of operations so that roller conveyors, or even hand-trolleys, are helped by gravity. The fall will be, of course, composting-shed to peak-heat rooms, and from there to the growing rooms, and finally to the spent-compost dump.

Unfortunately it seems to be necessary to allow room for the unloading of spent compost, but, if possible, one should try to avoid ever dumping it within the farm boundaries. Arrangements should be made from the beginning for the spent compost to be loaded directly onto lorries, and removed from the farm immediately the houses are emptied. Space should be borrowed temporarily or rented, at a considerable distance, for, even if a contract is entered into for the disposal of spent compost as soon as available, the transport on a stated day will sooner or later break down, and if the house has to be emptied then the only alternative is to unload on the farm grounds. In dry weather the top surface of the dump is soon in a condition where disease spores will be blown about the farm.

The growing sheds, whether for trays or shelves, should be arranged symmetrically, and, to aid fuel saving and constructional costs, should be designed to lie side by side so that a common wall exists between adjacent houses. This does not mean that this wall may be of the thinnest possible construction. It should be well-insulated, especially where shelf-beds are employed, because the peak-heating of one house will cause heating up in an adjacent house where crops may be growing,

and in the summer months it will be difficult to keep the latter at a reasonably low temperature. The necessity for a high insulation factor between houses is not so important where trays are employed, because peak-heating takes place elsewhere.

In laying out a farm, it is not advisable to have the growing-sheds too large and consequently be left with too few units for efficient working. For example, with a farm having 10,000 sq. ft. of shelf-beds, which is a comfortable size, it would be better to have 10 houses each of 1,000 sq. ft. than 5 houses of 2,000 sq. ft. Not only is the loss reduced when a house is overwhelmed by disease or insect pests, but the labour employed on the various operations is better able to cope with it.

It may be argued that operations such as turning, filling and emptying houses can be dealt with in large units by having casual labour over and above the normal staff on a few days in the year, while the remainder of the work will be light enough to be handled by a small permanent staff. This is workable when the grower is competent enough to produce a first-class compost and a good crop every time he fills a house, but failures prove costly when the units are large. The smaller the units, the more individual crops are obtained, and the sooner the beginner learns from his early mistakes.

There are other reasons why the smaller units should be favoured. Although most growers know of the irritating habit which mushroom houses have of synchronising themselves so that all the houses appear to be flushing together, usually at the week-ends, a farm split up into small units stands a better chance of producing a steady daily total than one with larger units and the same total area.

While on the subject of houses 'flushing' in synchrony, the following may be of interest. On a certain shelf-bed farm, with a 12 week cropping period, each house was filled $2\frac{1}{2}$ times per annum, which meant that with 12 houses, a new house was filled every 12 days approximately. With this schedule cropping was very irregular from day to day, and the houses were usually at the peaks of their flushes together. Later, in order to increase the annual yield, the cropping period was reduced, and each house was filled 3 times per annum.

This meant filling a house every 10 days instead of 12 days as before. It was soon apparent that cropping was much more even, and the reason must have been as follows. At around 61° F. which was the average temperature of the growing rooms, a graph of individual house cropping showed that the interval between flushes was approximately 12 days, which, of course, applies to any farm more or less. Because a house came into crop every 12 days under the old schedule, it coincided with the second flush of the previous house, the third flush of the one before that and so on. Altering the filling interval to 10 days had the effect of staggering the peaks of the flushes, and thus evening out the crop.

Not only is the detailed layout of a farm worth studying carefully before construction starts, but also its geographical position if the grower has any choice in the matter. Formerly, soil governed the choice of site, but now that peat and other artificial casings are achieving some

measure of success, it is not so essential to build on a site where there is a suitable subsoil.

The most important question to be asked is, will sufficient labour of a suitable type be readily available? If one chooses to build a few miles from an industrial town, the odds are that labour problems will be difficult especially if one is off the rail and bus routes. The men of the local villages will either be working on farms in the locality, or be attracted by higher wages in the town. The work on a mushroom farm is arduous, and many growers who are placed in such a situation, find a real problem on their hands when only a sprinkling of the infirm and old is available.



W. S. GALBRAITH defends his THIN-BED THEORY AND PRACTICE

I have asked, and been generously granted, some space in which to defend my theory against Dr. Edwards's withering blast!—mainly because the subject seems to be of more than academic interest to an industry dying by inches from an economic cancer.

My critic seems to have missed many of the underlying principles and implications of my article: or it may be that he considers that the "misleading" of which he complains is due to an over-simplification caused by the avoidance of specific reference to house-space, and by the failure of Table I to carry down the argument to the really short cycles from which the really notable profit increases are obtained. Heaven knows, the article was long enough! Much had to be left to the readers' intelligence; and it seems that Dr. Edwards is less willing than I to grant them the possession of this faculty.

Starting, then, at the italicised paragraph near the end of his notes, and on those associated with it—for these seem to sum up his chief misconceptions. Here, Dr. Edwards states (and implies that I have missed) the truism that the best way to Get Big is to Grow. Thereby, he merely initiates an interesting discussion on the nature of an Inflationary Spiral, or an Infinite Regress—cold comfort this, surely, to impoverished mushroom men. A little earlier, he has pointed the equally self-evident fact that to carry bed-depth reduction beyond a certain point must inevitably result in the need of capital outlay on growing space (back to the Spiral!) Quite obviously, the principal limiting factor is, as he says, lack of such space; but to suggest that manure scarcity or high cost (synonymous terms, really) are *not* also a sharp limiting factor, is to invite the question, "Why, then, MRA Synthetic?" Earlier still in his notes, he questions the validity and the practical usefulness of Table I's Profit column. Let me, then, restate briefly what *was*, in fact, explicitly stated in the article (page 14, third paragraph onwards).

The Profit column in the Table 1 shows what you might expect to make in a year (accepting, for the moment, my costs and price figures) if you laid down only one ton for each experimental crop, and tried out the various depths and cycles mentioned. Thus, if you substitute your own costs and price figures, and multiply the one ton by the figure appropriate to your own case, you should get a close approximation to the actual profits expectable from the various arrangements.

Dr. Edwards objects to my allocation of costs. Surely, as a scientist, he is aware that the examination of any problem demands that we regard as fixed (temporarily) certain basic factors. Thus, the ultimate picture which we draw will not tell the whole story, or be entirely accurate, but will enable us to form some definite conclusions *on the particular aspects which we set out to consider*. To forecast precisely your annual profit would demand the clairvoyant ability to *know* your yield (and everything else) before you had grown your crops! In the absence of such psychic powers, the best we can do is compromise, by fixing arbitrarily such items as we can, and then considering the variables introduced by the varying techniques under review. The compromise which I have chosen is to settle on a net mean selling price; to differentiate only these costs which are obviously and directly affected by the techniques, and to flat-rate all others against the chosen selling price. Why not? Variations in technique are designed to alter yield—hence profit; but they will only alter such of the lumped costs as are the product of yield (e.g. packing), and will thus maintain the relationships required. The incidence of *fixed* charges per lb. is quite immaterial to our considerations. If the Table were re-drawn to exclude all fixed charges entirely, the final column would still give comparisons as accurate as at present—but still more “misleading.” Some of the variables which I have put into “C” are, however, arguable, and Dr. Edwards has selected several:—

PEAK HEAT. I made no reference whatever in the article to peak heating costs being more with thin beds—indeed, we find the exact opposite to be the case.

BED HEATING AND CHEMICALS. Both these are referable to what I might label—

PRINCIPLE No. 1. There is no inherent magic in thin beds as such. Their sole purpose is to limit the use of space, compost, heat, insecticides, etc., watering, and general attention, to such times as the beds are in a state of maximum productivity.

Thus, both heat and chemicals are being used to better advantage, and so more economically, with short cycles, and to the above I might add as a corollary:—

PRINCIPLE No. 2. The crux of the Short-cycle theory is that Short Cropping=maximum immunity from enemies=minimum expense on defensive measures.

In the past few years here I have more than doubled output, yet actually reduced both heating and insecticidal expenses, in fact, all “enemy control” expenses. Perhaps Dr. Edwards has no enemies.

If he can offer me a killer for mine (mainly Cecids and Vert-de-Gris) then I might even consider reverting to long cycles—life would seem simpler that way. Meantime, I have largely abandoned efforts to kill—I simply run away instead, with some considerable success. House-cleaning chemicals (a small item) are included in the “B” costs, and pre-bed chemicals (e.g. stack “dopes”) come under “A” costs. The question of Spawn is too involved for discussion here, but I stick to my point—spawn by volume, not by area. I will give the logical argument, and means of experimental proof, to anyone interested.

Dr. Edwards's most serious charge, however, is contained and explained(?) in his paragraph on page 61 starting with a bold type **BUT..**. Now my Table 1 is an impartial (and incomplete) document; it shows procedures both favourable and otherwise to thin beds and short cycles. Its purpose is mainly to indicate the improved profit *trend* as crops per annum are multiplied. Dr. Edwards chooses to compare line 2 of the 9" section with line 1 of the 4½", thereby picking one of the best thick-bed lines, and showing thin beds at only 3 crops per annum—their worst possible arrangement. But who would choose to use line 1 when lines 3, 6, or 7 offered reasonable prospects of much better profit? Clearly, however, the Thin-bed man is still down on the deal even on the best (£43.4.0) line, if space is his only worry. And this brings me to the underlying (but, I thought, quite obvious) intention of the whole article, which was:—

To suggest to Thick-Bed growers several alternative ways by which (given a Heat House for every four Growing Houses, with one set of Trays per Heat House, but no additional growing houses), Thin Beds and Short Cycles could be manure-saving and/or more profitable. Here are some of the alternatives:—

- (a) A substantial proportion of the existing profit could still be obtained in the face of a manure supply cut by up to 50%.
- (b) Profit would be almost as before if using about 75% of previous manure supply.
- (c) A slightly larger profit would be possible with a small saving on manure.
- (d) By adding about 33% capacity to each house (by means of inter-shelving, or, at a pinch, trays) a very substantial extra profit would accrue from the existing manure intake.

The attached Table 2 shows the idea clearly, and should simplify for readers Dr. Edwards's rather involved “But . . .” paragraph. It also carries the progressive depth reduction a few stages further. (The validity of the table has been proved down to 3½”—the “ultra-thins” show the likelihood of similar confirmation, but have not as yet been replicated enough for certainty. In any case it will be observed that below 3½”, worthwhile profit increase demands an entry into the Inflationary Spiral, and thus ultra-thin beds are beyond the scope of the present discussion entirely. Only in the planning of a new or extended farm would their possibilities be considered in the design.)

Finally, of Dr. Edwards's closing remarks I can make no sense at all. Suppose that, in order to convince each other, or the public, John Smith and I had our annual yields certified, and mine worked out at 2 lb. sq. ft. as against his at 1.5—would that make me the more efficient grower? If his beds were half the depth of mine, certainly not. Would my profits be greater than his? If his (undisclosed) costs were 1 6d. per lb. and mine 2 6d.—again, certainly not. I repeat my original statement—"Divorced from costs and bed depths, 'lb. per sq. ft.' has no meaning at all." Pounds per Ton, though still far from complete, would be much more informative, and would give at least a hint of costs.

TABLE 2

- (A) Shows alternative arrangements for a farm of 12 Growing Units of 1,000 sq. ft. Shelf Area (Total 12,000 sq. ft.) Air Bed Ratio 4 : 1.
- (B) Same, modified by inter-shelving (or trays) to give unit area of 1,300 sq. ft. (Total 15,600 sq. ft.).
- (C) Farm enlarged by extra building, units grouped and modified as at (B) to give double capacity of 2,000 sq. ft. (Total 24,000) which is desirable for beds below 3½".

1. Bed Depth	2. Per Ton Area	3. Tons Per House	4. Crops Per Annum	5. Houses Filled P.A.	6. Tons Used P.A.	7. Profit Per Ton	8. Profit Per Annum	9. Tons Used P.A. Plus or Minus As Against 7. Beds	10. % Beds
Scheme (A) House Area 1,000									
9"	100	10	3	36	360	£7.16.0	£2808	-83	same
7"	130	7.7	"	"	277	£9 8.0	£2274	same	-43
4½"	200	5	4	"	180	£10 16.0	£1944	-97	-180
"	"	"	4½	48	240	£10.16.0	£2592	-37	-120
"	"	"	4½	52	260	£10.16.0	£2808	-17	-100
"	"	"	5	60	300	£10.16.0	£3240	-23	-60
Scheme (B) House Area 1,300									
3½"	260	5	5	60	300	£12.8.0	£3720	-23	-60
"	"	"	6	72	360	£12.8.0	£4464	-83	same
2½"	400	3½	"	"	234	£15.8.0	£3135	-23	-126
Scheme (C) House Area 2,000									
2½"	400	5	6	72	360	£16.8.0	£4824	-83	same

NOTE:—All above figures based on those of Table 1 in original article. Profit figures are, of course, relative, not necessarily actual, as they depend on the costs and prices operating on any particular plant.

WAGES AGAIN

Farm workers are expected to submit a claim next month for a further increase in wages. Many branches of the National Union of Agricultural Workers are pressing for £7 instead of £6 for a 47-hour week Some are also pressing for the working week to be cut to 44 hours. Other branches want the rate increased to £8 weekly.

Daily Telegraph, 2.3.54.

THE FRED. ATKINS ALPHABET—D

Dactylium dendroides. A parasitic mould which can do considerable damage by creeping over the casing and enveloping growing mushrooms in a suffocating "cobweb" of mycelium. When I consulted a leading mycologist in London as to whether it was, as I had been told, an imperfect form of *Hypomyces rosellus*, I was asked: "Is that important, to you?" Which made me think.

DDT. Dichloro-diphenyl-trichloroethane was the first of the really good insecticides introduced to mushroom growers after the war. Used with reckless abandon in Britain, perhaps leading to the breeding of DDT-resistance in some mushroom flies. Still regarded with grave suspicion in the United States, where its use on cropping beds is forbidden.

Dehydration. There is, as far as I know, no commercial-scale drying of cultivated mushrooms in Great Britain. Threaded, and strung up to dry, they look singularly unappetising. Dried properly, and then ground to make a flavouring, they are probably excellent; but one shudders at the retail price.

de Tournefort, J. When this French pioneer wrote his classic textbook 250 years ago he knew almost as much as we know to-day—or very little less, should I say?

Disease. Probably our best friend! At any rate, disease more than any other single factor prevents mushroom-growing from becoming easy. The unhygienic farm is almost sure to fail sooner than later.

Dithiocarbamates. The zinc salt has given much relief in the States from parasitic moulds, but much less in Britain, I'm told. Is this so? And, if so, why?

Ditylenchus. These eelworms have a stylus or spear-like mouth which is used to pierce the delicate tissue of mycelial threads so that the pests can suck out the food stored therein for our mushrooms. They like the mushroom for its flavour; they can scarcely appreciate its health-giving properties, nor be prone to anaemia. Once they get sucking they are cruelly indifferent to our fate, and leave the compost wet and foul-smelling, and of no further use to us.

DNOC. Dinitro-orthocresol, advocated by United States growers more than ten years ago, has suddenly become very popular South of the Thames, where the Malevolent Ms., *Myceliophthora* and *Megaselia*, have wrought such damage recently in company with La France "Malformations." One would wish a little more care were taken sometimes over such a generous distribution of SDNOC, the dangerous sodium dinitro-orthocresylate.

Draughts. Mushrooms dislike them, and ventilators should be baffled out of consideration for their delicate skins.

Dried Blood. See *Blood*. Or, if you can get it, use Urea.

Drop Disease. Not, in this context, a malady of our cropping charts during recent months, but an affliction of the mushroom which, when attacked, becomes watery inside and wet and sticky outside. Rare in Britain, I think and hope.

Drosophilidae. According to *Ministry Bulletin* 34, the larvae of flies of this family have been found in decomposing mushrooms. Happily they have not as yet a taste for fresh "marketable" mushrooms.

Duration of Cropping. Once upon a time I published a simple means of deciding the approximate economic moment to throw out a crop. Then R. L. O. Jackson told me where I was wrong. Later E. H. Palfrey told us where both of us were wrong. I don't suppose anyone took any notice of what any of us said!



It was not only on the subject of mushrooms that I heard the comment: *The British research stations produce the best results and the Danish growers make the best use of them.*

PRISCILLA LANE in *The Grower*, 13.2.54.

Research Stations : 2

C. R. RASMUSSEN writes about

THE DANISH PROGRAMME

The Danish Mushroom Research Station, opened in 1952, is connected to the Horticultural Department of the Royal Veterinary and Agricultural College in Copenhagen. The laboratory was set up through Marshall Aid and the Danish Government, and is equipped with the usual apparatus for analysis and microbiological work. Improvements are planned; a sterile room is under construction and an electric autoclave has been ordered.

For practical experiments, two brick-built cropping houses have been erected, each measuring approximately 33 ft. by 16½ ft. One has 775 sq. ft. in shelves; the other is divided into two smaller rooms, one for peak-heating 600 sq. ft. in trays and the other for growing those trays. There is a steam boiler and a manure-turner, but unfortunately no turning shed yet.

The Ministry has been able to grant only £500 p.a. towards staff salaries, and therefore only one person is employed. Help, however, is available for composting and, temporarily, two students give valuable help.

The programme is in consequence restricted by the man-hours available, and initially these will be devoted to practical experiments. We started almost a year ago with trials with casing soils and supplemented horse-manure composts under summer conditions, and our present tests are a repetition in winter. It is considered valuable to learn how to manage the growing rooms at different times of the year.

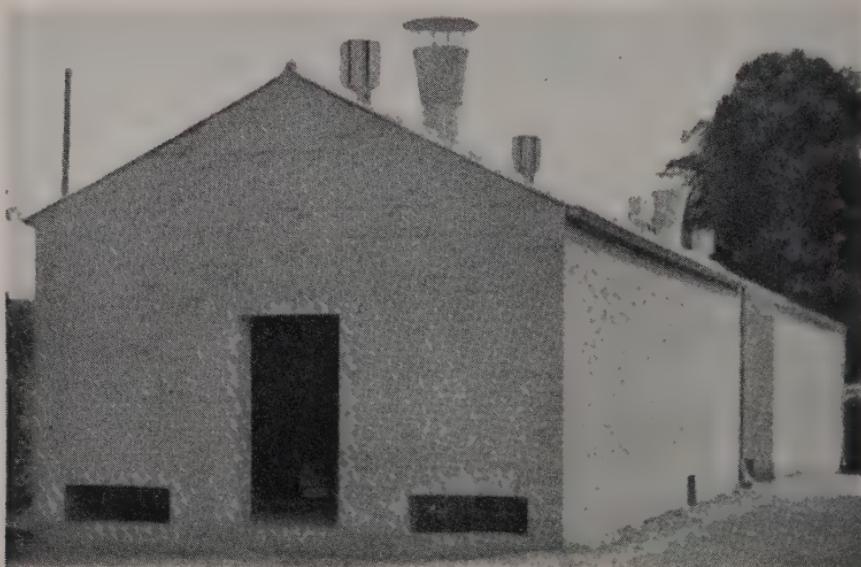
It is hoped to discover the yield potential of trays *contra* shelves by a series of trials conducted concurrently. One complication is the higher air-bed ratio in the shelf house; we are equalizing the two ratios by introducing a number of trays to the shelf house, and these will be used for small-scale pilot tests.

In the first experiment, fresh horse-manure supplemented by 8.8 lb. ammonium sulphate, 33 lb. limestone, 8.8 lb. superphosphate and 33 lb. gypsum per ton averaged 4.8 lb./sq. ft. in shelves when 130 sq. ft. was filled with one ton of manure (fresh weight). Fresh horse-manure to which only gypsum was added (22 lb. and 44 lb. per ton) was little better than manure without gypsum, the yield varying between 3 and 3½ lb./sq. ft. The picking period was 13 weeks, the weight was of mushrooms before trimming, and the size small, mushrooms averaging only $\frac{1}{2}$ oz.

Different casing soils were compared. A crumbled humus rich meadow soil was best, and a heavy yellow clay worst.

There was a rather big difference between trays and shelves during the first six weeks of picking, shelves cropping much better, but the difference then narrowed and there was little difference in the total crop after 13 weeks. The best combination of compost and soil, however, was about $\frac{3}{4}$ lb./ft. better on shelves than on trays.

The laboratory is responsible for advising and visiting growers. Open Days are held and lectures given. Future experiments will compare synthetic composts with horse-manure, new methods of bed treatment and composting technique, and natural and artificial casing materials. Work on pests and diseases is not forgotten. It is also hoped to start a series of fructification investigations, both in solution and in compost, as pure laboratory work; **but all will depend on time and money.**



CAPTAIN G. P. LAWRENCE *advocates* **LOCAL PUBLICITY**

Some publicity for Mushrooms can be obtained through the medium of the Provincial Press. This has been tried out successfully in several districts and there is no reason why it should not work elsewhere.

The methods by which mushrooms are grown is of interest to the public, who also can be educated as to how to cook them in a variety of new ways.

The success or otherwise of this idea is in the hands of individual members. Many of you know your local reporters. Suggest that they give your farm a write-up with photos which will be of local interest and include some cooking hints.

Or it may be that your paper has a Housewives Column. Those responsible for this are sometimes hard up for new ideas, and would welcome some recipes.

A brief and elementary account of how mushrooms are grown and some simple recipes are in course of preparation and will be obtainable from the Secretary. These you can give to the representative of your local paper to assist him with his article.

It should be possible to get a follow-up article later.

This form of publicity costs nothing, but requires the initiative and energy of the individual member.

WINDSOR, 6th - 9th JULY, 1954

Mr. E. H. Gardener, President of the NFU Market Produce Show Society Ltd., has forecast an outstanding success in 1954, when the Society will be staging its event at Windsor in conjunction with the Royal. The MGA is to have a stand in the NFU Section, as part of its new publicity campaign.

NEW MUSHROOM BOOK

“*Mushroom growing is rapidly becoming more profitable*, and this useful guide, written by the Nursery Manager at Cheshunt Experimental Station, will help both professional and amateur growers to greater success,” says an advance notice of A. A. Richards’s *Modern Mushroom Cultivation*, to be published shortly by W. H. & L. Collingridge Ltd.

DAMAGES FOR MGA MEMBER

Damages of £2,680 were awarded to Mr. F. G. Read, a 48-year-old nurseryman of Deopham, Norfolk, at Norfolk Assizes on Tuesday. He claimed that after a car crash three-and-a-half years ago he was unable to concentrate on mushroom growing and as a result his business lost £4,500.

Evidence in support of the claim was given by Dr. R. L. Edwards, Director of the Mushroom Research Station, Yaxley, that personal and concentrated effort on mushroom farms was of extreme importance.

Commercial Grower, 19.2.54.



ROSE COMB?

The monstrous group above was in a first flush and covered about one square foot. All the other mushrooms were perfect. The second flush was normal. In the third flush two-thirds of the crop (see left) was unsaleable because of warts. All subsequent flushes were normal.

The member who sent these photographs asks what the cause could be.

To clear a few . . .

PUBLICITY QUERIES

Many growers, whilst anxious to support publicity in principle, have, naturally enough, raised several queries, and explanations on a number of such points may not be out of place.

No hard and fast publicity plans have yet been made. The Committee felt that, first of all, it was necessary to ascertain just how many growers would support the appeal for funds and how much money was likely to be raised, each year, for publicity. Having ascertained the approximate financial figure it will then be possible to make reasonably hard and fast plans as to just how the money should be spent. The ultimate plans would then be made known to all members who would thus see just how it was proposed that the money should be spent.

No date has yet been fixed for the scheme to commence and no direct approach has been made to salesmen asking them to operate the levy. True, several salesmen have already intimated their willingness. On this point the Committee were of the opinion that only after sufficient support had been received from growers should salesmen be approached. If sufficient support is not received, then no point would be served in approaching salesmen.

Representation on the Publicity Committee is not necessarily restricted to its present membership. It is proposed to ask salesmen to be represented so that they too can have a say in the spending of the money.

Already the Committee is hampered by lack of money. At the last meeting the Executive Committee of the Association turned down an application by the Publicity Committee for the immediate use of £100 for preliminary publicity work on the grounds that money for such a purpose should be specifically raised for publicity. Rough plans for early publicity have already been approved by the Committee. These include mushrooms in cookery demonstrations by the Gas and Electricity Boards, which take place regularly in all large towns. It is proposed, in this respect, to supply mushrooms for such demonstrations and to distribute a selection of recipes to the general public. The supply of such mushrooms and the printing of recipes all involve financial outlay.

Plans have been made to publicise mushrooms at the Royal Agricultural Show, the Chelsea Flower Show and the British Food Fair, representation in each case being secured at very small financial outlay, thanks to the National Farmers' Union (Royal Show), The Bradford Fertilizer Co. (free stand space at Chelsea) and the Essex F.U. Horticultural Committee (Food Fair) and, in each case, as well as our own exhibition at Tunbridge Wells, special leaflets, explaining the difficulties of mushroom growing and at the same time explaining just why mushrooms justify their price, are to be distributed. But, for the necessary attendance at the shows mentioned and the printing of the leaflets, money is required.

The Committee do not hold the view that the signing of the form is absolute and binding. Any grower can withdraw his or her support at any time. Many have signed with the proviso that the majority of growers take part.

Finally, the Publicity Committee hope that, not only will the scheme have started by that time, but, at the annual general meeting in October, they will be in a position to place their publicity plans for the coming year before the members, to be approved, or thrown out, as the members see fit.

W.R.A.



IMPORTS FROM EIRE—AND FRANCE

One of the matters which have occupied the attention of the MGA Executive Committee for some time is the amount of mushrooms now coming into this country from Southern Ireland and, when the figures contained in the table below became available to the Committee, it was unanimously decided that, although the total importation from that source was only a small percentage, compared with the total production in this country, it was evident that the imports were showing a marked increase.

Your Committee, whilst not alarmed, caused various enquiries to be made on the influence these importations had on the home markets and the consequent price fluctuations and came to the conclusion that it was in the interests of the industry as a whole to call the attention of the Government to the position, through the National Farmers' Union.

Eire enjoys a position akin to the Dominions in this matter and, in consequence, Irish mushrooms coming into the country are not subject to any duty whatsoever. Such limitations as are operated are those imposed by freight charges and, in this respect, many consignments travel by air.

Already a meeting has taken place between representatives of the NFU, the MGA (Mr. F. L. Filmer) and the Ministry of Agriculture on the matter.

In the House of Commons last month, Sir Alfred Bossom (Con. Maidstone) asked the President of the Board of Trade (Mr. Peter Thorneycroft) if, in view of the substantial increase in the mushroom imports from the Irish Republic, he would take steps to regulate such imports. Mr. Thorneycroft replied, "No, sir. It would be contrary to our general commercial policy to impose quantitative restrictions for the purpose of protection."

Members can rest assured however that the MGA Committee will keep a careful watch on the situation and, meanwhile, Mr. Filmer's report is awaited with interest.

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Official figures of Imports of Mushrooms from EIRE for 1951, 1952 & 1953

	1951			1952			
	cwt.	£		cwt.	£	cwt.	£
January 347	6,325	..	336	5,787	.. 886	17,239
February ..	.. 360	6,756	.. 494	10,884	.. 564	11,268
March ..	.. 298	5,544	.. 484	10,081	.. 573	11,751
April ..	.. 330	6,008	.. 500	9,768	.. 473	9,463
May ..	.. 403	8,141	.. 625	11,279	.. 679	12,478
June ..	.. 352	5,385	.. 451	8,179	.. 508	7,990
July ..	.. 340	5,333	.. 390	7,068	.. 345	5,405
August ..	.. 311	5,216	.. 269	4,746	.. 241	4,290
September ..	.. 189	3,433	.. 306	6,035	.. 331	5,854
October ..	.. 320	6,601	.. 99	1,587	.. 558	10,331
November ..	.. 345	7,118	.. 423	8,634	.. 461	8,682
December ..	.. 322	6,349	.. 477	9,496	.. 570	10,214
TOTALS	3,917	£72,209	.. 4,854	£93,542	.. 6,189	£114,965	

Imports of mushrooms from FRANCE, 1951-1953

Figures of imports of mushrooms from France from 1951 to 1953 supplied by the NFU show a small decline from 1,549 cwt. in 1951, to 1,407 cwt. in 1952, and a sharp drop to only 604 cwt. in 1953. Particularly interesting are the figures for October, 1952 and 1953, for in 1952, the French apparently tried something of a blitz by sending over 476 cwt. whilst, last October, only 51 cwt. came from the same source.

	1951	1952	1953
January	130	.. 100	.. 70
February	108	.. 80	.. 53
March ..	109	.. 87	.. 47
April ..	163	.. 84	.. 48
May ..	192	.. 97	.. 58
June ..	123	.. 77	.. 48
July ..	130	.. 84	.. 52
August ..	123	.. 87	.. 28
September ..	113	.. 97	.. 63
October ..	136	.. 476	.. 51
November ..	128	.. 72	.. 43
December ..	94	.. 66	.. 43
cwts.	1,549	.. 1,407	.. 604

Apart from Eire, France was the only country exporting mushrooms to this country during 1951-53.

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ISLES OF SCILLY	-	-	-	SWANWICK
				GUERNSEY

Fred. C. Atkins introduces Dr. Stoller's PRINCIPLES AND PRACTICE OF MUSHROOM CULTURE

As this *MGA Bulletin* was going to press I received from Dr. B. B. Stoller a copy of his latest paper, a 47-page summary of the state reached in the scientific comprehension of factors relevant to mushroom culture on a commercial scale. It has been reprinted from *Economic Botany*, Vol. 8, No. 1 (Jan.-Mar., 1954). A quick perusal suggested it was sufficiently important to make a last-minute change in the contents of this issue, and here are a few notes upon it.

A great deal of the paper is taken up by esoteric discussions of underlying scientific principles and conflicting interpretations, and if Stoller sometimes hits hard it is because he feels he has the right to defend himself against criticism. Periodical full-length appraisals of this nature must be of inestimable advantage to research workers everywhere and to those growers who strive against increasing odds to keep pace with the quickening advance of science in the mushroom sphere.

Many questions of *commercial* importance are reviewed. Is air really unnecessary during spawn run? What is the result on the yield if the house at this stage is air-tight? Perhaps the buffering capacity of our composts, the flocculating agents present, the moisture content and ammoniation are more significant than pH in determining the cropping potential? Is the complete lack of success with added vitamins due to a sufficiency being synthesized microbiologically during composting? Was Hunter Carr's "dream farm" as far from practicability as some of us thought, after all? These and many other points grip the grower-reader's attention anew.

Stoller confided to me some time ago that he was planning an interesting development of the theories behind his pre-war composting drum. It was not the large-scale "tonneau" now operating experimentally at St. Cyr, but an automatic apparatus which he describes thus: "The idea of a carriage moving on a rack and pinion has been adopted universally in such machines as lathe, meat cutter, typewriter and saw mill. All that was necessary to modify this apparatus for mushroom culture was to suspend suitable screws with large blades from the beam of the carriage, and provide a perforated floor for aeration. Air is drawn through the mass of material as it is turned, under controlled conditions of moisture and temperature, so that the duration of composting is reduced to the few days formerly constituting the pasteurizing process The large initial capital investment required may delay its adoption."

There are interesting comments and theories on diseases, particularly Truffle, and there is a brief résumé of the work of "submerged culture." The growth of mycelium is practicable, but the mushroom flavour is generally weak, and "the many industrial laboratories" which endeavoured to commercialize the process "have discontinued operations." But—and it is a "but" we must bear in mind—"submerged culture certainly has possibilities . . . (although) it will probably be 10 to 30 years before the method is reduced to practice." And what will become of us then, poor things?

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PROF. PILAT'S OPINION

The MGA Library has received from Professor Albert Pilat a copy of his important "The Bohemian Species of the Genus *Agaricus*," published in Prague in 1951. His opinion on cultivated mushrooms is particularly interesting to growers:

The cultivated species are designated in the literature mostly as *Agaricus campester*, or as cultural races formed by cultivation from this species. But this designation is false. *Agaricus campester* is not cultivated at all, to judge from the material which I have had, and in my opinion it would cultivate badly as it is not a fungus pronouncedly coprophile like the two bisporic species which are the ones chiefly cultivated, viz., *Agaricus hortensis* Cooke and *Agaricus bisporis* Lange.

These two mushrooms are not varieties, but good species not formed through cultivation, for they grow wild and from nature were taken over into cultivation. That their receptacles grown in the dark, under different conditions of temperature and humidity, look sometimes slightly different is understandable.

A. villaticus Brond. is also, though rarely, cultivated in Europe and in America.

Cayley (Experimental Spawn and Mushroom Culture II. Artificial composts. *Ann. Appl. Biol.* 25: 322-340, 1938) studied the growth of mycelia from various mushrooms on composted and non-composted manure. From this it is evident that the wild 4-spored *Agaricus campester* and two other wild *Agaricus* forms are unable to grow on horse manure fermented by heating, which is the ordinary medium for the cultivated 2-spore forms.

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